

PROGRAM REQUIREMENTS DOCUMENT

for an

Integrated Display System 4 Replacement



September 20, 2007

Federal Aviation Administration
800 Independence Avenue SW
Washington, DC 20591

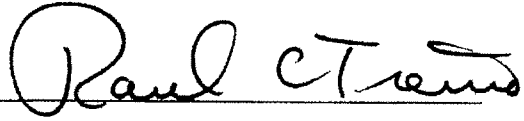
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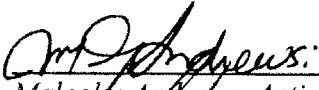
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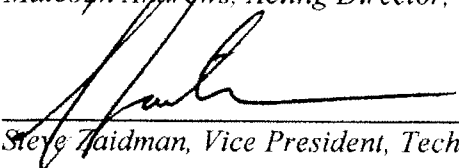
EXHIBIT 300, ATTACHMENT 1
PROGRAM REQUIREMENTS

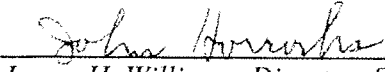
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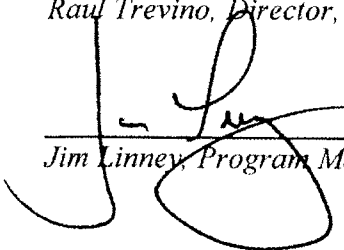
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Table of Contents

1. BACKGROUND.....	1
1.1 History.....	1
1.2 Mission Shortfall.....	2
1.3 Proposed Operational Capability	3
2. OPERATIONAL CONCEPT.....	4
2.1 Operations	4
2.2 Current System Architecture.....	4
2.3 Maintenance	5
2.4 Quantities and Location	5
2.5 Schedule Constraints.....	6
3. TECHNICAL PERFORMANCE	7
3.1 Operational and Functional Requirements.....	7
3.2 Information and Products Displayed	8
3.3 Performance Requirements	9
4. PHYSICAL INTEGRATION	13
4.1 Real Property.....	13
4.2 Environmental Compliance.....	13
4.3 Energy Conservation.....	13
4.4 Heating, Ventilation, Air Conditioning.....	14
4.5 Grounding, Bonding, Shielding, and Lightning Protection.....	14
4.6 Cables.....	14
4.7 Hazardous Materials.....	14
4.8 Power Systems and Commercial Power.....	15
4.9 Telecommunications	15
4.10 Special Considerations	16
4.11 Occupational Safety and Health Administration (OSHA)	16
5. FUNCTIONAL INTEGRATION	17
5.1 Integration With Other NAS (and Non-NAS) Elements.....	17
5.2 Software Integration.....	17
5.3 Standardization.....	18
5.4 Spectrum Management.....	18
6. HUMAN INTEGRATION	19
6.1 Human Factors Program.....	19
6.2 Human/Product Interface	19
6.3 Employee Safety and Health	19
6.4 Specialized Skills and Capabilities	20
7. SECURITY	21
7.1 Physical Security.....	21
7.2 Information Security.....	21
7.3 Personnel Security.....	22
8. IN-SERVICE SUPPORT.....	23
8.1 Staffing.....	23
8.2 Supply Support.....	23
8.3 Support Equipment	23
8.4 Technical Data	24

8.5	Reprocurement Data Package	24
8.6	Training and Training Support	24
8.7	First and Second Level Repair	25
8.8	Packaging, Handling, Storage, and Transportation	26
8.9	Property Disposal	26
8.10	Bar Coding	26
8.11	Material Management	26
8.12	Facility Codes	27
8.13	Certification	27
9.	TEST AND EVALUATION	28
9.1	Critical Operational Issues	28
9.2	Test and Evaluation Requirements	29
9.3	Field Familiarization	29
10.	IMPLEMENTATION AND TRANSITION	30
10.1	Surveys and Planning	30
10.2	Site Installation	30
10.3	Installation Activities	30
10.4	Equipment Delivery	30
10.5	Power-up Test and Compatibility	31
10.6	Transition	31
10.7	Site Acceptance Test (SAT)	31
11.	QUALITY ASSURANCE	32
12.	CONFIGURATION MANAGEMENT	33
12.1	Configuration Management Program	33
12.2	Software Configuration Management	33
12.3	Hardware Configuration Management	33
13.	IN-SERVICE MANAGEMENT	34
13.1	Product Baseline	34
13.2	Performance Plan	34
13.3	Performance Measurement	34
14.	SYSTEM SAFETY MANAGEMENT	35
14.1	Program Safety Management	35
14.2	Safety Assessments	35
14.3	Integrated Safety Plan	35
14.4	Standards	35
APPENDIX A.	DEFINITIONS	A-1
APPENDIX B.	ACRONYMS	B-1
APPENDIX C.	REFERENCES	C-1

1. BACKGROUND

1.1 History

Over the course of several decades, many automation, communication, navigation, surveillance, and weather systems have been developed and installed in air traffic facilities, including Air Traffic Control Towers (ATCTs) and Terminal Radar Approach Controls (TRACONs) throughout the National Airspace System (NAS). These terminal environment systems were provided to give controllers better tools and information with which to provide air traffic control services. As each new system was developed, the respective product teams focused on the technical scope of their efforts, rather than the user's environment in total. This has resulted in variations in presentation media, information retrieval methods, and display proliferation that can impact controllers' ability to efficiently and effectively access operational information.

Integrated display systems consolidate operational information to provide a powerful tool to rapidly exchange information that impacts the safe and efficient control of air traffic. The presentation of multiple sources of data on a single page, such as found in an Integrated Display System (IDS), allows for expeditious decision making by controllers thus increasing efficiency of operations. The expandable nature of properly engineered IDS workstations supports forecasted increases in air traffic capacity by providing a ready tool to facilitate new systems into a familiar display.

The IDS4 is a local and wide area network (LAN/WAN)-based information dissemination and display system that consolidates 9 to 13 operational NAS Systems and operational data onto a single display platform. The FAA has 2230 IDS4 workstations located in approximately 390 facilities that were initially installed from 1993 through 2004. IDS4 provides the users with immediate access to operational and support data such as automated distribution of weather from NAS systems, Approach Plates, Sectional and Low Altitude Enroute Charts, SIDS/STARS, Terminal Area Charts, NOTAMS, Letters of Agreement (LOA), Air Traffic Control Order 7110.65, Standard Operating and Emergency Procedures Manuals, and facility specific data.

IDS4 hardware, software, training and installation were procured from Systems Atlanta, Inc. (SAI) by the regions. Maintenance and support has been provided by the FAA and through regional contracts directly with SAI. Second level engineering support has been provided by AJW-14 in Oklahoma City, OK.

The IDS4 is a legacy system that has never been initially baselined as a system in its own right. Initial investments were made by the Regions without benefit of a national FAA Program Office baseline. Terminal Automation is seeking to establish a baseline for IDS4 Refresh and Sustainment which will assure funding and operations through the evolution of the system until the Next Generation capability is deployed to assume the IDS service (currently planned in 2019).

This Requirements Document is being provided as a part of Exhibit 300 Program Baseline as part of the plan to approve the IDS4 sustainment investment decision. The Program Requirements Document is based on the ACE-IDS system and the selected solution will be required to meet the requirements of the ACE-IDS baseline necessary for certification, but does not require any new functionality to the existing IDS4 system, ensuring no changes to the FAA's Enterprise Architecture Plan.

1.2 Mission Shortfall

1.2.1 Technology

IDS4 is a DOS-based network that is no longer supportable in today's PC market. Each motherboard generation takes up increasingly more memory, limiting the memory capacity with which DOS and the IDS4 software can work. Additional advances in technology, such as SATA drives, USB, and the move from PCI to PCI express create further obsolescence issues for IDS4. SAI, the IDS4 software developer, has stated they will not modify the software to accommodate these technology advances. The existing hardware is also failing and is no longer manufactured or supportable. Therefore as the workstations begin to fail, there will be a breakdown in communications between and within facilities. Data exchange will be reduced to telephone calls between facilities, information passed to positions on scraps of paper easily lost or misplaced, and communications errors as information is routed from person to person.

1.2.2 Maintainability and Supportability

As technology advances, the hardware and software manufacturers are no longer willing to support the existing IDS4 workstations. The FAA Logistics Center (FAALC) has nearly depleted their supply stock and critical levels may be realized by 2009. Obsolete technology has resulted in a continued increase in repair costs.

SAI second-level engineering support services contract options are only available through 2008 and an escalation of costs for further contracts would be likely. Additionally, AJW-14A and vendor second level engineering is unfunded in 2007. As reliability decreases for the existing IDS4 workstations, options for maintainability and supportability will no longer be available.

1.2.3 Situational Awareness Deficiencies

Shortcomings in Computer Human Interface (CHI) and physical and systematic integration of operational systems often interferes with controllers' efforts to sustain high levels of situational awareness. Factors contributing to diminished situational awareness are system clutter, display layout, non-standardized computer human interface, operator actions, and information. These factors are described in the paragraphs that follow.

1.2.3.1 System Clutter

Terminal environment systems used for information processing and display, information dissemination, control and monitoring, and traffic flow management need to be consolidated and integrated into a configuration that improves controller situational awareness and operational efficiency. These systems typically have separate display and control devices positioned wherever space is available. In a recent study of the ATCT operational environment, it was found that controllers had to move an average of seven times per minute, or once every 8 to 9 seconds, to access and input data required to develop and maintain situational awareness. This has resulted in controllers having to turn to view displays and input data at random locations throughout the ATCT, thereby reducing critical "looking out the window" time.

1.2.3.2 Display Layout

Information must be readily available and displayed in a manner that supports rapid evaluation of conditions. Due to finite ATCT cab sizes, the number of displays and data entry devices in the tower must be minimized and space for equipment optimized. The design and placement of new systems must take into account the ATCT cab size, local airport layout, and available space.

1.2.3.3 Standardized Computer Human Interface (CHI)

Typically, during design, integration and upgrade of terminal environment systems, CHI characteristics such as media presentation and information retrieval methods have not been standardized. Upgrades have been accomplished on a system-by-system basis, and have not generally considered the overall impact on controllers and the costs in training. Over time expectations are that standardizing CHI will improve user performance, satisfaction, and system acceptance by reducing the number of negative transfer errors. Likewise, addressing CHI during integration and upgrade is expected to yield significant savings in training cost.

1.2.3.4 Operator Actions

Controller tasks must be standardized to foster optimal situational awareness. Additional tasks, resulting from a lack of automated information distribution, such as requesting and receiving hourly weather via landline, detract from controller situational awareness.

1.2.3.5 Information

Controllers must be provided knowledge-based information, rather than just data. Automated capabilities are needed to alert controllers when critical response thresholds are exceeded. Decision-making tools must recommend solutions.

1.3 Proposed Operational Capability

The IDS4 Replacement is proposed as the next generation integrated display system. IDS4 is installed at 24 Operational Evolution Plan (OEP) airports, including Chicago, New York, and Southern California TRACONs. The system equipment will be installed at TRACONs and their associated Air Traffic Control Towers (ATCTs). IDS4 Replacement is the data display component of the total FAA engineering effort underway to address the deficiencies described above. IDS4 Replacement capability will use state of the art technology and include the most current information and weather products. The system is intended to reverse the system clutter trend by reducing the overall number of displays. At the same time, the replacement system is expected to significantly improve controller situational awareness by addressing the deficiencies described for display layout, standardized computer human interface, operator actions, and information.

2. OPERATIONAL CONCEPT

2.1 Operations

The IDS must provide rapid retrieval and display of a wide range of weather, operational support and administrative information to air traffic controllers in the terminal environment. The system must be flexible and scalable to meet individual user needs as well as future requirements. Information must be displayed in formats and contents designed for rapid operator understanding and assimilation with minimum human interaction. The information displayed must be identical in content and format to the source document or display whenever possible. For example, display of an airport approach plate will be identical to the paper approach plate published by the FAA, and display of Runway Visibility Range (RVR) system information will be identical to what is displayed on an RVR display. The system must consist of workstations networked together in local area networks (LANs) and wide area networks (WANs) to provide shared information management and display.

2.2 Current System Architecture

IDS4 is an integrated data collection, distribution, and display system especially designed to meet the information needs of air traffic control personnel. IDS4 provides a set of software tools that allow local facility personnel to plan, create, update, and use an individualized database of information based upon their local requirements.

The current IDS4 system architecture and external interfaces are depicted in **Figure 2-1, IDS4 Nominal Architecture**. The IDS4 consists of a single source major component, a Commercial Off-The-Shelf (COTS) personal computer (PC) with Microsoft™ Disk Operating System (MS-DOS) v 6.2 installed. There are several types of interface units used to receive source data and transmit data to remote facilities: Direct Data Interface (DDI), Single Interface Units (SIU), External Data Interface (EDI) Units, and a variety of modems. The IDS4 software is proprietary to SAI. In addition, System Administrator positions have a Flatbed Scanner and an external tape drive (or ZIP drive or external CD-RW drive) attached to the standard PC. The System Administrator PC may have both Windows™ 95/98 and MS-DOS 6.2 installed.

IDS4 data is distributed over a system of RS232/RS485 Serial LAN/WAN networks connecting many workstations, which may be located within a single facility, throughout an airport, or over a wide geographical area, linking host facilities with remote sites for data exchange.

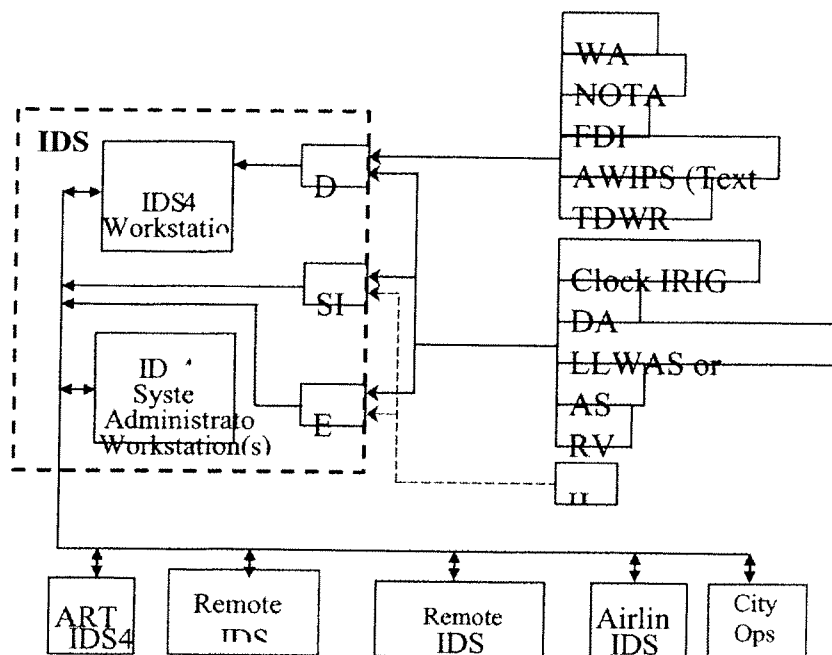


Figure 2.1. IDS4 Nominal Architecture

2.3 Maintenance

FAA Technical Operations specialists must perform on-site maintenance and certification services at individual FAA facilities. Maintenance is completed by the FAA site specialist through hardware replacement at the LRU level. Site spares are utilized to immediately replace failed units.

AJW-14A must assume responsibility for in-service support following system commissioning. AJW-14A must obtain support necessary to sustain the system through a separate contract vehicle with the vendor.

Depot level maintenance must consist of reordering or repairing failed lowest replaceable units (LRUs) that are shipped from a site or work center.

2.4 Quantities and Location

The IDS will utilize a phased approach to replace a maximum of 2230 workstations over a seven year

period at TRACONs and their associated ATCTs. Specific locations and delivery priorities will be provided at a later date.

2.5 Schedule Constraints

The IDS4 Replacement Program will be executed in a phased approach over a seven year period. The schedule is constrained by the initial budget and the amount of time required to complete the competitive procurement process. IDS4 Replacement milestone dates are not linked to other program schedules.

3. TECHNICAL PERFORMANCE

3.1 Operational and Functional Requirements

IDS shall be comprised of the latest market technology available to support current needs and future growth. The system architecture shall support individual tailoring of information presentation and scaleable to support the varying needs of users today as well as in the future. As a minimum the following functional components shall be included:

- 3.1.1** A workstation that consists of the hardware (computer, display monitor, keyboard and mouse or trackball) and software, located at an operator's location, necessary to retrieve and display all dynamic weather data and static information required by the statement of work for an individual operator.
- 3.1.2** A display monitor capable of providing visual and aural information to the operator. A workstation may include two integrated display monitors controllable by a single keyboard, and mouse or trackball.
- 3.1.3** A workstation capable of operating using flat panel displays.
- 3.1.4** A system capable of supporting various size display monitors and provide the same resolution.
- 3.1.5** Servers, Hubs, Routers, Modems, Switches, and related cabling necessary to perform all system functions.
- 3.1.6** A data base administrator (DBA) function to maintain the information on the system and perform other administrative functions, such as security administration.
- 3.1.7** A DBA function capable of adding, deleting, and editing information on the system; creating and formatting new display pages, editing or deleting display pages; and managing the information residing in the local database.
- 3.1.8** Provide DBA workstations with necessary input devices, such as a scanner, R/W CD and DVD.
- 3.1.9** Provide DBA workstations with automated tools that facilitate maintenance of the database and display pages.
- 3.1.10** Scalable system in order to meet the information display needs of the full spectrum of terminal environment facilities from very large to small terminal areas. For example, a single large system might be comprised of a TRACON LAN linked by a WAN with multiple airport towers and related facilities, such as AFSSs and military bases, some of which would have LANs within their facilities.
- 3.1.11** A system capable of sharing information in such a manner that an input made at any workstation will be distributed and available for display throughout the system.
- 3.1.12** A system capable of electronic transfer of data with other designated system WANs.
- 3.1.13** Modular system to support scalability, expandability, efficiency of life cycle support activities, and

investment benefits from economies of scale. An expandable system in the sense that additional workstations, or LANs, or both can be added to an existing system as the number of operators and locations supported by the system increase. The system will also be expandable in the sense that additional or reserve capacity can be provided to support increases in information stored and displayed on the system due to interfaces with new information sources or growth in information content, or the addition and display of new applications and interfaces.

3.1.14 Portable system in the sense that software applications may be hosted on future or evolutionary hardware platforms. The software shall be open architecture and facilitate adapting to relevant technology changes, such as in telecommunications.

3.1.15 Architecture capable of accepting input of information manually via a keyboard, mouse or track ball, as well as electronically via a scanner, compact disc (CD), digital video disc (DVD) or a telecommunications interface.

3.2 Information and Products Displayed

IDS4 Replacement shall receive and display at a minimum the information and products that follow. The interfaces required to display the data shall be developed in accordance with the appropriate NAS Interface Requirements Documents (IRDs) and Interface Control Documents (ICDs). These documents are governed by FAA-STD-025 Preparation of Interface Documentation.

3.2.1 Interfaces to FAA Equipment

Interfaces to FAA Equipment shall include the following:

- Runway Visual Range (RVR)
- IRIG Clock
- Digital Altimeter Setting Indicator (DASI)
- Notices to Airmen (NOTAMs)
- Low Level Wind Shear Alert System (LLWAS)
- Low Level Wind Shear Alert System II (LLWAS II)
- Automated Surface Observing System (ASOS)
- Flight Data Input/Output (FDIO) Weather Messages
- Terminal Doppler Weather Radar (TDWR)
- Advanced Weather Interactive Processing System (AWIPS)
- New Tactical Forecast System (NTFS)
- ASOS Controller Equipment IDS (ACE-IDS)

3.2.2 Data Imported by Facility Administrator

Data imported by facility administrator shall include the following:

- Standard Operating Procedures (SOP)
- Checklists
- Contact lists
- FAA and Local Orders
- National Flow Programs
- Approach Plates
- Airways and Sectional Charts

- Location Identifiers
- Aircraft Identifiers
- Preferred Routes

3.3 Performance Requirements

3.3.1 Operational Software

IDS shall use a commercially available operating system. IDS4 Replacement software shall have the capability to accommodate the constraints, peculiarities, and requirements of the system interfaces for the products. The system software shall have the capability to display data from individual interfaces such as RVR and DASI along with data from centralized external user interfaces such as the Volpe National Transportation Center and the Air Traffic Control System Command Center (ATCSCC).

3.3.2 Operational Hardware

IDS shall use COTS equipment that supports system evolution.

3.3.3 Processor Capabilities

IDS shall contain sufficient memory reserve capacity so that memory utilization does not exceed 50 percent of the maximum memory capacity.

3.3.4 Display Capabilities

3.3.4.1 IDS4 Replacement shall be displayed on a COTS Color Flat Panel Display Monitor. The viewing screen of the monitor shall be available in different sizes, with a minimum size of at least 17 inches measured diagonally. The minimum resolution of bit graphics display shall be 1280 (horizontal) by 1024 (vertical) pixels. Controls shall be accessible from the front of the monitor. The display and speakers shall provide visual and audible indications of alert conditions. The visual and audible indicators shall have the capability to be disabled. The display portion of the monitor shall be mountable on a standard COTS desk stand and flush mountable within an air traffic control console.

3.3.4.2 When viewed perpendicular to the viewing screen, the luminance of the monitor white screen shall be at least 210 candella/square meters for analog input and at least 220 candella/square meters for digital input.

3.3.4.3 The viewing screen of the monitor shall be visible from the front without obstructions caused by the monitor casing. The viewing screen shall be capable of being tilted 5 degrees forward and 15 degrees backwards about the horizontal axis.

3.3.4.4 Displays shall be fully readable from a horizontal viewing angle of at least plus or minus 60 degrees from normal to the face of the screen. Displays shall be fully readable from a vertical viewing angle of at least plus or minus 60 degrees.

3.3.5 Peripheral Devices

3.3.5.1 The IDS4 Replacement shall provide for a keyboard and pointing device.

3.3.5.2 The IDS4 Replacement shall provide a display monitor, speakers, CPU with Read/Write compact

disc (CD) or Digital Video Disc (DVD). require the following peripheral devices:

- 3.3.5.3 The IDS4 Replacement shall provide a standard equipment rack capable of housing the network hubs, switches, servers, maintenance terminals, and other equipment necessary to allow for clustering and networking.

3.3.6 Telecommunications

- 3.3.6.1 IDS4 Replacement shall use Local Area Networks (LANs) and Wide Area Networks (WANs) for workstation-to-workstation, workstation-to-server, and server-to-server communications. LANs will connect workstations to a server within a single facility. WANs will connect individual remotely located workstations to a server or connect LANs located in different facilities. LANs shall utilize IP based ethernet communications and be capable of supporting Ethernet II (DIX V2.0 standard) and IEEE 802.3 standards at 10Mbps and 100Mbps. WANs shall utilize IP based serial communications and be capable of supporting the RS-530 standard at a minimum serial leased line rate of 56Kbps.
- 3.3.6.2 The IDS4 Replacement LAN shall connect directly using RS-530. At these facilities, the LAN shall use a leased line to connect to the nearest FAA facility that has FAA WAN availability and then connect to the FAA WAN at that point of presence.
- 3.3.6.3 Telecommunications and computer industry standards shall be utilized to provide for the development of future interfaces to permit the display of data from additional NAS systems. System hardware shall be sized to accommodate multiple interface cards including 10/100 Mb Ethernet, EIA-232, EIA-422, EIA-485, fiber optics, and 20 milliamp current loops.
- 3.3.6.4 Network topologies shall support TCP/IP and the operating system.

3.3.7 System Maintenance Monitoring and Display

3.3.7.1 System Monitoring

IDS4 Replacement shall provide capability to monitor and report the health of all components within the system. The system shall monitor and report the health of system telecommunications.

3.3.7.2 Status Display

IDS4 Replacement shall provide the capability to display the health status of all components within the system. IDS4 Replacement shall provide the capability to display the health status of system telecommunications.

3.3.8 Archive Capabilities

3.3.8.1 Data Archive Requirements

The IDS4 Replacement shall archive designated data received.

3.3.8.2 Maintenance Status Indicators

The IDS4 Replacement shall archive all maintenance status indicators.

3.3.8.3 Erroneous Data Archive Requirements

IDS4 Replacement shall archive erroneous data. Erroneous data messages include, but are not limited to, messages that are incomplete, are incorrectly formatted, and contain illegal range values for a specific field in the message.

3.3.8.4 Error Messages

IDS4 Replacement shall display error messages in plain English that advise of malfunctions and faults. The system shall archive all error messages.

3.3.8.5 Archive Storage Requirements

IDS4 Replacement shall retain all archived information until manually deleted or 15 calendar days, whichever occurs first.

3.3.8.6 Data Retrieval Requirements

IDS4 Replacement shall provide the capability to retrieve archived information.

3.3.8.7 Data Deletion Requirements

IDS4 Replacement shall automatically delete archived data in accordance with FAA Order 7210.3, Facility Operation and Administration. The system shall have the capability to manually delete archived data.

3.3.8.8 Printing Requirements

IDS4 Replacement shall provide the capability to print archived information.

3.3.9 Malfunction Alarm Requirements

3.3.9.1 Audio Alarm Requirements

IDS4 Replacement shall provide aural alarms in accordance with the original system IRDs and ICDs in which the interface will replace. The operator shall have the ability to control the volume of aural alarms.

3.3.9.2 Visual Alarm Requirements

IDS4 Replacement shall provide visual alarms in accordance with the original system IRDs and ICDs in which the interface will replace.

3.3.9.3 Alarm Termination

IDS4 Replacement alarms shall remain until acknowledged by the operator.

3.3.10 Reliability, Maintainability, and Availability

3.3.10.1 Hardware Monitoring Requirement

IDS4 Replacement shall monitor all hardware within the system.

3.3.10.2 Software Monitoring Requirement

IDS4 Replacement shall monitor all software within the system.

3.3.10.3 Data Reporting

IDS4 Replacement shall resume data reporting immediately upon restoration of power.

3.3.10.4 Recovery Requirements

IDS4 Replacement shall have automatic recovery functions.

3.3.10.5 Diagnostic Requirements

IDS4 Replacement shall automatically perform diagnostics on system components.

3.3.10.6 Lowest Replaceable Unit (LRU)

IDS4 Replacement shall have fault isolation to the LRU.

3.3.10.7 Service Level Requirements

The IDS4 Replacement service level shall be Essential.

3.3.10.8 Service Availability

The operational service availability of IDS4 Replacement shall be 0.999.

3.3.10.9 Mean Time To Repair (MTTR) Requirement

The mean time to repair IDS4 Replacement shall be 30 minutes or less.

3.3.10.10 Mean Time Between Failure (MTBF) Requirement

IDS4 Replacement shall have a mean time between failure of not less than 2190 hours.

3.3.10.11 Preventive Maintenance Requirement

IDS4 Replacement shall require preventative maintenance no more than two times per year.

4. PHYSICAL INTEGRATION

4.1 Real Property

4.1.1 Land

No real estate procurement is expected.

4.1.2 Space

IDS4 Replacement must reside in existing space.

The readiness of physical facilities needed for integration of IDS4 Replacement must be ensured. The physical facilities may need to be modified to accept new equipment.

Facility space planning must be completed for each system.

Space must be provided for prime mission equipment, physical storage, maintenance, monitoring and control equipment, transition for in-service changes and administrative functions to sustain IDS4 Replacement throughout its lifecycle.

Site surveys and site installation plans must be completed to identify and document necessary modifications to assigned space.

4.1.3 Display Location

IDS4 Replacement displays must be integrated into the tower cab in accordance with FAA Order 6480.7, Airport Traffic Control and Terminal RADAR Approach Control Facility Design Guidelines.

4.2 Environmental Compliance

The IDS4 Replacement must comply with:

- Executive Order 12088, Federal Compliance with Pollution Control Standards;
- Code of Federal Regulations (CFR), Title 40, *Environmental Protection*;
- Department of Transportation (DOT) and FAA environmental orders and directives such as the National Environmental Policy Act (NEPA);
- State environmental orders and directives; and
- Local environmental orders and directives.

4.3 Energy Conservation

IDS4 Replacement must comply with the requirements of Executive Order 13123, *Greening the Government Through Efficient Energy Management*, dated June 3, 1999.

4.4 Heating, Ventilation, Air Conditioning

IDS4 Replacement must operate with existing facility Heating, Ventilation, and Air Conditioning (HVAC).

4.5 Grounding, Bonding, Shielding, and Lightning Protection

IDS4 Replacement must comply with the following documents. Where conflict exists between documents, FAA Orders will take precedence.

- FAA-STD-019E, *Lightning and Surge Protection, Grounding, Bonding, and Shielding Requirements for Facilities and Equipment*;
- National Electrical Code;
- ANSI/IEEE STD 1100-1992, *Grounding, Shielding, and Bonding*;
- FAA Order 6950.19, *Practices and Procedures for Lightning Protection Grounding, Bonding, and Shielding Implementation*;
- FAA Order 6950.20, *Fundamental Considerations of Lightning Protection Grounding, Bonding, and Shielding*; and
- FAA-G-2100H, *Electronics Equipment, General Requirements*.

4.6 Cables

IDS4 Replacement cabling must comply with NFPA Standard 70, *National Electric Code*, and FAA-C-1217, *Electrical Work, Interior*.

IDS4 Replacement cable installation plans and installation must be in conformance with FAA-G-2100H, *Electronics Equipment, General Requirements*, Section 3.3.1.3.10.2.

4.7 Hazardous Materials

4.7.1 Hazardous Materials Content

IDS4 Replacement components must be delivered free of hazardous material to include the following:

- Asbestos, FAA Order 1050.20, *Airway Facilities Asbestos Control*;
- Polychlorinated biphenyls (PCBs), FAA Order 1050.14, *Polychlorinated Biphenyls (PCBs) in the National Airspace System*;
- Lead, FAA Order 1050.1, *Policies and Procedures for Considering Environmental Impacts*; and
- Class I ozone-depleting substances in accordance with FAA Order 1050.10, *Prevention, Control, and Abatement of Environmental Pollution at FAA Facilities*.

4.7.2 Hazardous Materials Handling

Handling of hazardous materials must be in accordance with 29 CFR 1910, *Occupational Safety and Health Standards*; FAA Order 8040.4, *Safety Risk Management*; and 29 CFR 1910.1000, *Air Contaminants*.

4.7.3 Hazardous Materials Disposal

The selection of materials for IDS4 Replacement will take into consideration removal, cleanup, and recycling, during the installation, use cycle, modification and disposition of the system.

The system's equipment disposal plans must be developed and implemented for the identification, handling, storage and disposal of hazardous materials.

4.7.4 Hazardous Materials Data Sheets

Material Safety Data Sheets (MSDS) must be delivered concurrent with each IDS4 Replacement delivery/installation.

4.8 Power Systems and Commercial Power

IDS4 Replacement equipment must connect to facility critical power buses if available for primary system power. At sites without critical power, an Uninterruptible Power Supply (UPS) must be installed to permit an orderly shutdown of the workstation during power outage. All equipment must meet the requirements of FAA-G-2100H, *Electronic Equipment, General Requirements*, Appendix I, including harmonics, power factor, and current inrush testing.

4.9 Telecommunications

The telecommunications supporting IDS4 Replacement must be an industry standard Ethernet network operating up to 100mb per second. The network must be in accordance with ANSI/IEEE 802.3 standards. IDS4 Replacement must use Local Area Networks (LANs) and Wide Area Networks (WANs).

IDS4 Replacement equipment must be capable of operation with the existing FAA owned and leased communication system and the FAA Telecommunications Infrastructure (FTI) that will be the future communications system. Communications must be via standard leased telephone circuits either using modems ranging in capability from 19,200 bits per second to 56,000 bits per second and the existing FAA communications system or future FTI system.

Telecommunications and computer industry standards must be utilized to provide for the development of future interfaces to permit the display of data from additional NAS systems. The development of unique or proprietary physical or electrical interfaces must not be permitted. IDS4 Replacement hardware must be sized to accommodate multiple interface cards including 10/100 Mb Ethernet, EIA-232, EIA-422, EIA-485, fiber optics, and 20 milliamp current loop.

The IDS4 Replacement software application must utilize TCP/IP for communications from workstation to workstation, workstation to server, and server to server. Network topologies supported by the software application are limited only by the restrictions of TCP/IP, UNIX or Windows.

4.10 Special Considerations

IDS4 Replacement interfaces and equipment must be in accordance with FAA Order 1200.22, *NAS Data and Interface Equipment Used by Outside Interests*.

4.11 Occupational Safety and Health Administration (OSHA)

IDS4 Replacement equipment must be in compliance with OSHA personnel safety requirements defined in FAA-G-2100H, *Electronic Equipment, General Requirements*; FAA Order 3900.19, *Occupational Safety and Health Program*; 29CFR 1910, *Occupational Safety and Health Standards*; and 29CFR 1926 *Safety and Health Regulations for Construction*.

5. FUNCTIONAL INTEGRATION

5.1 Integration With Other NAS (and Non-NAS) Elements

IDS4 Replacement will require interfaces with NAS and Non-NAS Elements in order to receive the data products as defined in Section 3 and below.

5.1.1 Interfaces to FAA Equipment

Examples of interfaces to FAA Equipment include the following:

- Runway Visual Range (RVR)
- IRIG Clock
- Digital Altimeter Setting Indicator (DASI)
- Notices to Airmen (NOTAMs)
- Low Level Wind Shear Alert System (LLWAS)
- Low Level Wind Shear Alert System II (LLWAS II)
- Automated Surface Observing System (ASOS)
- Flight Data Input/Output (FDIO) Weather Messages
- Terminal Doppler Weather Radar (TDWR)
- Weather and Radar Processor (WARP)
- Advanced Weather Interactive Processing System (AWIPS)
- New Tactical Forecast System (NTFS)
- ASOS Controller Equipment IDS (ACE-IDS)

5.1.2 Data Imported by Facility Administrator

Examples of data imported by facility administrator include the following:

- Standard Operating Procedures (SOP)
- Checklists
- Contact lists
- FAA and Local Orders
- National Flow Programs
- Approach Plates
- Airways and Sectional Charts
- Location Identifiers
- Aircraft Identifiers
- Preferred Routes

5.2 Software Integration

IDS4 Replacement software integration, development, and documentation must be carried out in accordance with FAA-Standard-026, *NAS Software Development*.

5.3 Standardization

IDS4 Replacement interface documents must be in accordance with FAA Standard 25, *Preparation of Interface Documentation*.

5.4 Spectrum Management

The IDS4 Replacement must employ properly allocated radio spectrum protected for aeronautical safety services.

6. HUMAN INTEGRATION

6.1 Human Factors Program

A Human Factors Program must be established for the IDS4 Replacement Program in accordance with the *FAA Human Factors Job Aid*.

IDS4 Replacement must conform with the following, including their addenda:

- *FAA Systems Safety Handbook*, and
- DOT/FAA/CT-03/05 HF-STD-001, *Human Factors Design Standard (HFDS) for Acquisition of Commercial-off-the-Shelf (COTS) Subsystems, Non-Developmental Items (NDI), and Developmental Systems*, Dated May 2003

6.2 Human/Product Interface

IDS4 Replacement will provide the following system design features:

- Physical, visual and auditory interfaces and communications links among personnel, as well as between personnel and their equipment, under normal, adverse, and emergency conditions.
- Provisions for minimizing the physical stress effects of the task or job demands within the work environment i.e., insulation from unnecessary vibration, noise, dust, glare, heat/cold; provision of adequate general and supplemental lighting, with dimming capability, to support both operational and maintenance activities; protection from excessive lifting or reaching; and minimization of repetitive movements conducive to repetitive stress injuries.
- Provisions for minimizing the psychological stress effects of the task or job demand within the work environment i.e., minimizing the activities that induce unnecessary time pressures, way-finding confusion, ambiguity, annoying quirks, unnecessary steps, etc.
- Compatibility of the design, the location, and the layout of controls, displays, workspaces, maintenance access and storage provisions following established control-display compatibility guidelines.
- Provisions for workstation adjustments that accommodate individual anthropometrical differences between operators while affording the operator a means to change his/her workstation posture for positional rest and support.

6.3 Employee Safety and Health

Human factors issues are critical to safety, availability, and the effectiveness of the IDS4 Replacement Program.

6.3.1 Early human-in-the-loop prototyping of the human interfaces must be accomplished prior to major design commitments.

6.3.2 IDS4 Replacement equipment must monitor and control infrastructure equipment in accordance

with OSHA 29 CFR 1910.147, *Control of Hazardous Energy* (Lockout/Tagout), to prevent employee exposure to hazards from unexpected energizing, startup of machine or equipment, or the release of stored residual energy.

6.3.3 IDS4 Replacement must provide alarms and alerts for any failure mode that poses a safety risk to the operator or the public.

6.4 Specialized Skills and Capabilities

6.4.1 Any specialized skills or training required for controllers to use or operate the IDS4 Replacement must be provided prior to commencement of operations.

6.4.2 Any specialized skills or training required for technical operations personnel to maintain the IDS4 Replacement must be provided prior to commencement of operations.

7. SECURITY

7.1 Physical Security

IDS4 Replacement must comply with FAA Order 1600.69, *Facility Security Risk Management Program*. Sensitive information relative to the IDS4 Replacement program must be safeguarded in accordance with FAA Order 1600.2, *Safeguarding Controls and Procedures for Classified National Security Information and Sensitive Unclassified Information*.

7.2 Information Security

7.2.1 Information

IDS4 Replacement will be a scaleable NAS system designed to provide administrative and weather information.

7.2.1.1 The IDS4 Replacement design must comply with FAA Order 1370.82 *Information System Security Program* to provide adequate levels of confidentiality, integrity and availability. A key aspect of the design philosophy will be to minimize the risk of attacks to the NAS from sources both external and internal to the FAA.

7.2.1.2 In addition, the IDS4 Replacement must:

- Include protection from being saturated with false messages that could degrade or disrupt service.
- Defend against spoofing.
- Ensure that an attack on a system element does not render any other system element inoperable.
- Provide the capability to detect and trace all security relevant actions to specific users, devices, or processes for online or offline review.

7.2.1.3 IDS4 Replacement must be in accordance with Notice 1370.38, *Password Administration*; FAA Order 1200.22, *NAS Data & Interface Equipment Used by Outside Interests*; and the *FAA Information Systems Security (ISS) Program Handbook*.

7.2.1.4 The IDS4 Replacement operating system must include the latest security revisions. Active process ports that are unnecessary for system operation must be disabled. IDS4 Replacement software application level access must provide access control and authentication. Password implementation must be in accordance with FAA password policy. Warning banners must be displayed as part of the initial logon process for a user.

7.2.2 Computer Security

IDS4 Replacement must be in accordance with FAA Order 1370.82, *FAA Information Systems Security Program*; and FAA Information Systems Security Architecture.

7.2.3 Internet Security

IDS4 Replacement Internet connectivity must be in accordance with FAA Order 1370.79, *Internet Use Policy*; FAA Order 1370.83, *Internet Access Points*; and FAA Order 1370.84, *Internet Services*.

7.3 Personnel Security

7.3.1 Personnel security controls must be implemented in accordance with FAA Order 1600.1, *Personnel Security Program*.

7.3.2 Contractor and industrial personnel security requirements must be in accordance with FAA Order 1600.72, *Contractor and Industrial Security Program*.

8. IN-SERVICE SUPPORT

An Integrated Logistics Support (ILS) program will be established in accordance with FAA Acquisition Management System (AMS) guidance to ensure integrated logistics support requirements are uniformly identified, acquired, allocated, controlled, and maintained.

8.1 Staffing

Support staffing for IDS4 Replacement must be in accordance with FAA Order 1380.40, *Airway Facilities Sector Level Staffing Standard System*.

8.2 Supply Support

IDS4 Replacement logistic support must be in accordance with the FAA Acquisition Management System (AMS) Policy; Section 6, Integrated Logistics Support; FAA Order 4250.9, *Field Materiel Management and Control*; FAA Order 4650.19, *Supply Support Criteria for Repairable Items*.

The FAA Logistics Center (FAALC) will act as item managers for IDS4 Replacement and manage the supply support system. Depot level maintenance must consist of reordering or repairing failed lowest replaceable units (LRUs) that are shipped from a site or work center.

8.2.1 Initial Site and Depot Spares

IDS4 Replacement site and depot sparing must be determined in accordance with FAA Order 6000.38, *Policy to Determine NAS Equipment Sparing Requirements for Airway Facilities Work Center*.

IDS4 Replacement must be delivered with initial site and depot spares. An analysis will be made to determine the repair versus discard policy for components.

8.2.2 Screening

National Stock Numbers must be assigned to IDS4 Replacement material in accordance with FAA Order 4500.3, *Federal Catalog and Standardization Programs (FCSP)*.

The Logistics and Inventory System (LIS) must be used to order replacement assemblies, subassemblies and component LRUs. The system uses National Stock Numbers (NSN) as the identifier. Accordingly, all LRUs will be screened and assigned NSNs.

8.3 Support Equipment

IDS4 Replacement unique equipment must be designed to maximize use of support equipment, test equipment and tools in the FAA inventory. IDS4 Replacement must also minimize the requirements for additional or unique support and test equipment. Any specialized support equipment, test equipment or tools developed to support maintenance at either site or depot levels, must require prior FAA approval and be the property of the Government.

8.4 Technical Data

8.4.1 Technical Instruction Books (TIBs)

8.4.1.1 IDS-4 Replacement manuals and technical instructions must be provided in accordance with FAA Order FAA-D-2494, *Technical Instruction Book Manuscript: Electronic, Electrical and Mechanical Equipment, Requirements for Preparation of Manuscript and Production of Book*.

8.4.1.2 Technical Instruction Books (TIBs) must be approved and baselined through the FAA Configuration Management (CM) process prior to delivery to the field. Any changes to TIBs, after baseline delivery, also will require FAA approval.

8.4.1.3 Manuals and applicable Commercial Off-the-Shelf (COTS) documentation must be delivered to each site electronically and in hardcopy prior to equipment installation.

8.4.2 Drawings and Specifications

IDS-4 Replacement drawings and specifications must be provided in accordance with MIL-DTL-31000, *Technical Data Package Specifications*.

8.5 Reprocurrency Data Package

A Reprocurrency Data Package (RDP) including engineering drawings, changes, and associated lists for Tower systems, if ordered, must be delivered to the FAALC. RDPs must be identified as contract options to be delivered upon request.

8.6 Training and Training Support

8.6.1 Training

IDS-4 Replacement training must be in accordance with FAA-STD-028, *Contract Training Program*. The training must provide FAA personnel with the knowledge, skills, and abilities to install, test, operate and maintain IDS-4 Replacement equipment.

8.6.2 Technical Operations (AF) Training

8.6.2.1 Technical Operations training must be developed to support the maintenance concept and specifically address certification in accordance with FAA-STD-028, *Contract Training Programs*. Complete training packages will be turned over to the FAA Academy for development, maintenance, and administration.

8.6.2.2 Training must provide specialists with the knowledge, skills, and abilities to install, operate, test, troubleshoot, maintain, and certify the IDS-4 Replacement system, subsystem(s), and equipment.

8.6.2.3 Training content must also include test tool operation, operation of all test equipment and all peripheral interfaces/inputs, software functions required for system operation, system interaction, and the processing and display of system products.

8.6.2.4 IDS-4 Replacement performance examinations must be provided for Technical Operations specialist certification on the system.

8.6.2.5 IDS-4 Replacement Technical Operations personnel must receive recurrent skill training.

8.6.3 Second Level Engineering Training

Second-Level Engineering Training must be developed to provide the skills and knowledge required to permit Government engineers/technicians to perform second level hardware and software maintenance on IDS-4 Replacement systems.

8.6.4 System Administrator and Security Administrator Training

IDS-4 Replacement System Administrator and Security Administrator Training must be developed to provide the knowledge to understand the purpose of the system components, understand their functionality, and provide the skills required to start, administer, and restart the system.

8.6.5 Air Traffic (AT) Controller Training

8.6.5.1 IDS-4 Replacement must have a training capability for AT to train personnel on the system functionality and provide the knowledge and skill sets needed to effectively use the systems. Air Traffic Controller Training must be developed in accordance with FAA-STD-028C, *Contract Training Programs* and training must address equipment operation, Computer Human Interface (CHI), and Air Traffic Control operational functionality and procedures.

8.6.5.2 Complete training packages must be turned over to the FAA Academy for development, maintenance, and administration.

8.6.5.3 IDS-4 Replacement performance examinations must be provided for AT specialist certification on the system.

8.7 First and Second Level Repair

8.7.1 First Level Repair

Maintenance must be in accordance with FAA Order 6000.15, *General Maintenance Handbook for Airway Facilities* and FAA Order 6000.30, *National Airspace System Maintenance Policy*.

8.7.2 Second Level Repair

Prior to the first IDS-4 Replacement deployment, second level repair documentation for hardware and software maintenance must be provided to the FAA.

Engineering support must be in accordance with FAA Order 1100.157, *National Systems Engineering Divisions Maintenance Program Procedures*, *Operational Support (AOS)* and FAA Order 6000.30 *NAS Maintenance Policy*.

8.7.3 Depot Level Maintenance

8.7.3.1 Lowest Repairable Unit (LRU) Repair

Depot level maintenance must consist of repairing or contracting repair of failed LRUs that are shipped from a site and work center.

8.7.3.2 Lowest Repairable Unit (LRU) Replacement

LRU repair costs must not exceed 65% of LRU acquisition cost. If the LRU repair cost exceeds 65% of the acquisition cost of a new LRU then the LRU must be replaced.

8.8 Packaging, Handling, Storage, and Transportation

IDS4 Replacement packaging, handling, storage, and transportation must be in accordance with American Society for Testing and Materials (ASTM)-D3951-95, *Standard Practice for Commercial Packaging*.

8.9 Property Disposal

Disposal of excess equipment must be in accordance with FAA Order 4800.2, *Utilization and Disposal of Excess and Surplus Personal Property* and be coordinated with the NAS Logistics Property Management Division.

8.10 Bar Coding

IDS4 Replacement hardware either owned by the FAA or located on FAA or government property must be bar-coded in accordance with FAA-BCATS-1998-002, *Bar-Code Asset Serial Number Symbolology, Quality and Format Specifications* and UCC/EAM 128 *Asset Supply Chain Management*.

IDS4 Replacement must employ FAA-approved bar coding, from the major assembly to the LRU level.

8.11 Material Management

8.11.1 General

IDS4 Replacement material management must be in accordance with FAA Order 4140.1, *Integrated Material Management Program*.

8.11.2 Inventory

IDS4 Replacement material must be inventoried in accordance with FAA Order 4633.1 *Physical Inventory*.

8.11.3 Removal from Inventory

Lost, damaged, misplaced, or destroyed material must be removed from inventory in accordance with FAA Order 4630.3, *Survey of Lost, Damaged, or Destroyed Government Personal Property*.

8.11.4 Depot Inventories

Depot inventories of operating material must be maintained in accordance with FAA Order 4630.1, *Management of Depot Inventories of Operating Material*.

8.11.5 Project Material Management

F&E material must be managed in accordance with FAA Order 4650.7, *Management of NAS F&E Project Material* and FAA Order 4650.30, *Management and Control of NAS F&E Projects/Material*.

8.12 Facility Codes

A facility identification code must be assigned for IDS4 Replacement in accordance with FAA Order 1375.4, *Standard Data Elements and Codes*.

8.12.1 Facilities, Services, and Equipment Profiles

IDS4 Replacement must have a profile in the Facilities, Services, and Equipment Profiles (FSEP).

8.12.2 Facility Reference Data File Dissemination

IDS4 Replacement Facility Reference Data File (FRDF) information must be disseminated in accordance with FAA Order 6030.45, *Facility Reference Data*.

8.13 Certification

8.13.1 Technical Operations Certification

Technical Operations (AF) personnel must be certified in accordance with FAA Order 3400.3, *Airway Facilities Maintenance Personnel Certification Program*.

8.13.2 Service and System Certification

IDS4 Replacement services and systems that meet the criteria specified in FAA Order 6000.15, *General Maintenance Handbook for Airways Facilities* must be certified. IDS4 Replacement services that require certification must be testable.

9. TEST AND EVALUATION

9.1 Critical Operational Issues

Critical Operational Issues must be identified during system testing and subsequently adjudicated by the vendor. System Factory Acceptance Test (FAT) will be conducted at the vendors location. FAA Operational Test will be conducted at the William J. Hughes Technical Center (WJHTC) and one key site. Testing must be conducted to ensure functional end-to-end interoperability and sub network performance requirements can be met in an operational environment, and to resolve the following Critical Operational Issues (COI):

- Does IDS4 Replacement interface and operate with existing equipment and systems?
- Can the system accommodate defined, planned, new system interfaces and enhancements without degrading performance?
- Does IDS4 Replacement provide the required level of information security?
- Can the system transition safely and expeditiously with minimal impact, as defined within the approved transition and implementation plan, with no degradation to NAS operations?
- Does IDS4 Replacement training effectively support all required operational, maintenance, and support activities?
- Does IDS4 Replacement provide the required level of reliability, maintainability, and availability to support continuous operations without degrading performance?
- Do IDS4 Replacement elements provide for effective operation, maintenance and support when deployed in the NAS?
- Does the system provide timely and accurate information to manage the NAS infrastructure?
- Does the system effectively receive, process, and display operational data and products from multiple systems?
- Does IDS4 Replacement provide Air Traffic personnel suitable and effective access to official weather and/or operational data to identify conditions that may impact air traffic operations?
- Does the system provide timely and operationally effective data to Air Traffic?
- Does the system provide suitable and effective tools for the creation and adaptation of display products to meet the needs of Air Traffic field facilities?
- Does IDS4 Replacement provide suitable and effective aural and/or visual alarms for predetermined criteria?
- Does the system interface bi-directionally with specified system(s)?

9.2 Test and Evaluation Requirements

Test and Evaluation (T&E) is conducted by the FAA in accordance with *Acquisition Management System (AMS) Test and Evaluation Process Guidelines*, to evaluate the subsystem operational effectiveness and suitability including compatibility, interoperability, degraded operations, maintainability and supportability. Testing will include mandatory evaluation for safety, security, environmental, and energy conservation factors as appropriate to the system/service architecture. IDS4 Replacement test plans and other documentation must be developed and approved by the FAA prior to execution. Test planning and conduct will involve all the stakeholders, e.g., NAS users and external users as appropriate. All required testing activities must be successfully completed prior to deployment or system commissioning.

9.2.1 Factory Acceptance Test (FAT)

Factory Acceptance Tests must be conducted for each IDS4 Replacement deployed at the vendor's facilities. The William J. Hughes Technical Center (WJHTC) will provide a test team to witness testing, as required.

9.2.2 Operational Test and Evaluation (OT&E)

The FAA must conduct an OT&E on the first system.

9.2.3 Site Acceptance Test (SAT)

Site Acceptance Tests must be conducted for each IDS4 Replacement deployed.

9.3 Field Familiarization

FAA Air Traffic and Technical Operations specialists perform field familiarization to confirm readiness for integration of the system into each NAS site, leading to system commissioning. IDS4 Replacement field familiarization testing must include proper installation and interface to the existing NAS; verification that operational procedures and system documentation are in place; determination that proper logistics and support are available; and, that site personnel are trained and ready to use the system.

10. IMPLEMENTATION AND TRANSITION

10.1 Surveys and Planning

10.1.1 Site Surveys

Site surveys must be conducted at each site prior to equipment deployment to determine IDS4 Replacement facility requirements. Site surveys will determine necessary facility modifications including space or location, heating, ventilation, air conditioning, and power needs required for system deployment.

10.1.2 Product Implementation Plan

An IDS4 Replacement product implementation plan must be generated using current guidelines consisting of those activities necessary to prepare the site, deliver systems, install hardware, integrate systems, test, and commission.

10.2 Site Installation

10.2.1 A Site Implementation Plan (SIP) must be prepared in accordance with current guidelines.

10.2.2 Site preparation for IDS4 Replacement must be planned, scheduled, and overseen by facility personnel.

10.2.3 The FAA must provide site preparation engineering support to each site. Site preparation includes heating, ventilation, and air conditioning (HVAC), space, lighting, and power to the extent necessary for system installation.

10.2.4 All work to be performed on site must be coordinated with the designated Technical On-site Representative (TOR).

10.3 Installation Activities

Contractor installation activities must not degrade air traffic operations. IDS4 Replacement installation work must be in accordance with FAA-G-2100H, *Electronic Equipment, General Requirements*; NFPA, Standard 70; and local and state codes. Installation activity must control and minimize noise, dust, disturbing light, and excessive traffic in critical areas.

10.4 Equipment Delivery

10.4.1 Equipment delivery must be coordinated with the Technical Officer's Representative (TOR) to ensure that personnel and internal and external space are available to accept deliveries at established times.

10.4.2 Contractors must be responsible for determining the conditions necessary for interim storage and security of delivered equipment and supplies.

10.4.3 Contractors must be responsible for moving IDS-4 Replacement equipment into the facility as well as placing and installing the equipment.

10.5 Power-up Test and Compatibility

10.5.1 Initial power-up testing must be conducted on non-operational active power centers.

10.5.2 IDS-4 Replacement electrical equipment must be tested for power compatibility prior to connection to FAA power panels.

10.5.3 Electrical equipment must be tested for compliance with FAA-G-2100H, *Electronic Equipment, General Requirements*, and FAA Order 6950.2, *Electrical Power Policy Implementation, NAS Facilities*.

10.6 Transition

10.6.1 Transition Plan

An IDS-4 Replacement Transition Plan must be developed in accordance with the FAA's Implementation Planning Guidelines to ensure the continuity of services. Transition is the aggregate of activities for multiple programs, product implementation, facility modernization, and expansion within a specific facility or field environment. These activities include installation, integration, equipment acceptance testing, and external facilities.

IDS-4 Replacement must interface with FAA facilities regardless of the transition state or level of technical evolution of each site. The operational capability of the system must be maintained as systems are installed or decommissioned in a facility.

10.6.2 Transition Approach

The transition approach must include a process for moving between systems, elements and components that is operationally acceptable.

10.6.3 In-Service Transition

Air traffic operational capability must be maintained during transition. The IDS-4 Replacement transition strategy must provide for interfaces to ensure the continuity of Air Traffic Control services.

10.6.4 Coexistence with Present System

The installation and operation of IDS-4 Replacement must produce no adverse impact upon the other NAS systems with which it interfaces.

10.7 Site Acceptance Test (SAT)

Site Acceptance Tests must be conducted for each IDS-4 Replacement deployed.

11. QUALITY ASSURANCE

An IDS4 Replacement Quality Assurance Program (QAP) must be established and maintained by the contractor in accordance with the requirements of ANSI/ASQC-Q-9001, and ISO-9000-3, *Quality Management and Quality Assurance Standards - Part 3: Guidelines for the Application of ISO 9001:1994* to the Development, Supply, Installation and Maintenance of Computer Software and provide at a minimum:

- A quality assurance organization that has sufficient responsibility and authority to identify and evaluate quality problems, and to initiate, recommend, or provide solutions.
- Procedures and controls to assure adequate configuration management during all operations through final acceptance.
- Controls to assure that all inspection and testing are performed in compliance with contract requirements and that all test data is complete, correct, traceable, repeatable, and acceptable.
- Maintenance of proper record keeping function to provide objective evidence and traceability of operations performed.
- Procedures and controls for assuring that all software products or services procured from subcontractors conform to contract requirements.
- Procedures and controls to assure that all documentation is adequately reviewed and meets contract requirements.
- Procedures and controls for the prevention of software and system deficiencies, detection and analysis of deficiencies when they do occur, as well as procedures for corrective action.

The FAA will implement a system of periodic internal quality audits or reviews to verify quality activities and related results are in compliance with planned arrangements, and to verify the QAP is performing effectively.

12. CONFIGURATION MANAGEMENT

12.1 Configuration Management Program

IDS4 Replacement configuration management must be in accordance with FAA-STD-021, *Configuration Management*.

Any change from the existing operational system, configuration management functionality must be submitted to the Government for approval prior to incorporation into the system design.

Configuration management must be applied to all aspects of IDS4 Replacement, including Software, Hardware, Facilities, Documentation, Site Adaptation Data, Interfaces, and Tools.

12.2 Software Configuration Management

12.2.1 Configuration management tools must be provided to verify the software configuration, both nationally and locally.

12.2.2 An automated configuration management function must track software changes and the associated authorizations from one software baseline to the next software baseline.

12.2.3 An automated configuration management function must provide security so that no changes to software occur without authorization.

12.3 Hardware Configuration Management

12.3.1 All LRUs must include and be identified by manufacturer's model number, revision, and serial number.

12.3.2 Management tools must be provided to record and track all failure data to include: date and time of failure; model, serial, and part numbers of assemblies; model, serial, and part numbers of failed components; location; type of failure; actual repair time; and maintenance actions required.

13. IN-SERVICE MANAGEMENT

13.1 Product Baseline

The IDS4 Replacement baseline must be established and declared by the Terminal Automation Configuration Control Board (CCB). The CCB will review and either approve or disapprove changes to the baseline. Product baselines may be changed as a result of technology refresh, pre-planned product improvement, Engineering Change Proposals (ECPs), NAS Change Proposals (NCPs), and requests for deviation and waiver.

13.2 Performance Plan

A system performance evaluation plan must be developed for IDS4 Replacement. The IDS4 Replacement performance plan states measurable performance goals, resource needs, performance indicators, evaluation bases, and audit trails for measures. If measurable goals are not feasible, either an alternative that describes program success levels or a statement of why performance goals are not practical should be presented.

13.3 Performance Measurement

A system performance measurement process must be established for IDS4 Replacement. The IDS4 Replacement system performance measurement process provides accurate data for monitoring execution of the system, uses an effective management control system without imposing specific cost and schedule management control systems, and ensures internal management control processes.

14. SYSTEM SAFETY MANAGEMENT

14.1 Program Safety Management

Program Safety Management must be in accordance with FAA Order 840.4, *Safety Risk Management*, the *FAA Safety Management System Manual*, and the ATO-S 2006-1, *Safety Risk Management Guidance for System Acquisitions (SRMGSA)*.

14.2 Safety Assessments

IDS4 Replacement program safety assessments must be conducted in accordance with FAA *Safety Management System Manual* and ASD-100-SSE-1, *FAA System Safety Management Program*.

14.3 Integrated Safety Plan

A Preliminary Integrated Safety Plan (pISP) must be developed for the IDS4 Replacement Program. A final ISP must be developed for the final investment decision in accordance with ATO-S 2006-1, *Safety Risk Management Guidance for System Acquisitions (SRMGSA)*. The ISP must include utilization of a Hazard Tracking and Risk Resolution (HTRR) System.

The ISP may include a Sub-System Hazard Analysis (SSHA), System Hazard Analysis (SHA), Operations and Support Hazard Analysis (O&SHA), and Health Hazard Assessment (HHA).

14.4 Standards

IDS4 Replacement must comply with the following standards:

- Executive Order 12196, *Occupational Safety and Health Program for Federal Employees* (establishes and maintains occupational safety and health programs to meet requirements of PL 91-596, Section 19, *Occupational Safety and Health Act*);
- Title 29 CFR 1960, *Basic Program Elements for Federal Employee Safety and Health Programs and Related Matters*;
- FAA Order 3900.19, *Occupational Safety and Health Program*, (states policy and provides the basic guidance for implementing the FAA Occupational Safety Program in full conformance with Executive Order 12196); and
- FAA Order 3900.19, *Occupational Safety and Health Program*, Chapter 3, paragraph 27 (addresses the correction of unsafe conditions and practices (abatement) and establishes the requirement for an abatement plan in the event corrections cannot be accomplished within 30 working days).

APPENDIX A. DEFINITIONS

Alarm.

- (a) A visual indication of an alarm condition, which may be reinforced by an audio signal.
- (b) The situation when the value of a monitored parameter is outside the specified acceptable range.

Alert.

- (a) A visual indication of an alert condition that may be reinforced by an audio signal.
- (b) An operational status/condition status condition of a NAS infrastructure resource in which the resource is still capable of performing all of the resource's functions at the ideal level of performance, but some internal aspect of the resource has degraded or failed, and the functions of the resource may degrade or even fail unless management and/or maintenance action is undertaken. For example, a resource with one or more internal redundant components will transition from Normal to Alert when the last redundant component has failed, leaving only a single component operating.

Analysis. This method of verification consists of comparing hardware or software design with known scientific and technical principles, procedures, and practices to estimate the capability of the proposed design to meet the mission and system requirements. When certain elements of design are comprised of previously qualified elements such as commercial off-the-shelf (COTS) equipment, then analysis of previous qualification testing in meeting specification requirements may be used to reduce the amount of qualification testing.

Architecture. The organizational structure of system resources and the concept of interaction among them.

Asset. A tangible item that represents value to the NAS.

Attribute. Characteristics or parameters of managed resources. In the context of monitoring, attribute refers to sensor or derived data that is directly obtained during data acquisition or determined by status determination processing. In the context of control, attribute refers to effectors or actuators that are subject to adjustment via control commands.

Availability. Probability the system, subsystem, or piece of equipment will operate satisfactorily (NAS-SR-1000).

Baseline. The initial configuration of any item (including software, hardware, requirements, and documentation) which is formally designated and managed by a unique identifier and which is "frozen" at a specific time during the configuration item's life cycle. The baseline, plus any approved changes, constitutes the current configuration.

Certification. The technical confirmation that the service system is providing, and/or is capable of providing, the specified service to the user at any given time. The completion of certification requires a confirming action by an authorized AF specialist.

Command. Data input through file, pointers, menu selection, function keys, keystroke combination, or other entry mechanisms.

Commercial Off-The-Shelf (COTS). A hardware or firmware component which:

- (a) Is, or has been, offered, sold, leased, or licensed to the general public in the course of normal business operations at prices based on established catalog or market prices, or
- (b) Has been fully developed and tested, is in production, and does not meet the criteria of a) above solely because it is not yet available in the commercial marketplace.

Component. A collection of hardware or software modules considered as a single object for the purposes of monitoring and control.

Computer Human Interface (CHI). An aspect of a computer system, implemented in both hardware and software, which permits interaction between the user and the computer's coded computational procedures. The visual displays, input devices, and dialogue, taken together as a whole. In conceptual terms, the set of features that support communication between the user and the computer.

Depot.

- (a) An FAA supply facility that serves as the major logistic support facility for on-site and central maintenance activities.
- (b) A central maintenance facility that performs repair, alignment, calibration, complete overhaul, and rebuilding of complex equipment. The maintenance depot may be a commercial manufacturer/supplier, a commercial repair facility not associated with manufacture of the repaired item, or a Government repair facility.

Derived Data. Derived data refers to monitored data that is determined from an interpretation of other sensor data (or recursively, other derived data) or that is provided by a computing device (for example, self-test results from diagnostic equipment).

Display. The hardware that provides information views to a user. Examples include a cathode ray tube (CRT) and a liquid crystal display (LCD).

Equipment. A complete operating assembly, either operating independently or within a system or subsystem.

Facility. The total electronic, environmental, electric power generation or distribution system, and the structures used to house, support, and/or protect contained systems and their users. A facility may include a number of systems, subsystems, or equipment, e.g., a long-range radar facility, or it may in its entirety consist of only a single system, subsystem, or equipment such as an isolated RCL repeater facility.

Failure. The cessation of the ability of a system or any of its components to perform a specified function or set of functions.

Fault. A condition of a configurable item which degrades or interrupts its ability to perform one or more of its designated functions.

Function. Any system capability.

Hardware Component. A tested collection of mechanical and electrical modules which perform simple or complex functions.

Human Factors. The discipline concerned with the design and evaluation of products and tools that match people's needs and that supports effective, efficient, and safe human performance.

Infrastructure Resources. The software applications, networks, equipment, services, and installations needed for the functioning of the NAS.

Interface. The functional or physical capability that provides communication among NAS resources.

Interoperability. The ability to exchange data with other NAS elements.

Lowest Replaceable Unit (LRU). An essential support item which is removed and replaced at the field level to restore the end item to an operationally ready condition. The lowest level of hardware indenture authorized for field level removal and replacement.

Maintainability. A measure of the ease and speed with which a system or component can be repaired and returned to the on-line state following a failure.

Maintenance.

- (a) The process of testing or restoring a NAS infrastructure resource to an operationally ready condition.
- (b) An operational status in which a NAS infrastructure resource is off-line and unavailable for operational use. This status is used while performing off-line tests not requiring end-to-end connectivity or to restore failed resources to an operationally ready condition.

Must. The word "must" is used whenever this requirements document expresses a provision that is binding or identifies a characteristic that Tower systems must possess in order to be acceptable to the Government.

NAS. National Airspace System; the collection of services that are provided to the flying public, airlines, and airports.

NAS Infrastructure. The physical components of the NAS, excluding people. This includes systems, leased services, support services, inventory, vehicles, and real estate. The infrastructure supports services such as surveillance, display, communications, navigation, etc.

NAS Service. A core function performed by the NAS in the execution of its mission to provide safe separation and control over aircraft, e.g., aircraft separation, navigation, aviation information.

Parameter. A measurable attribute of a resource.

Pre-Planned Product Improvement (P³I). A planned, iterative development process for system hardware and/or software that provides additional or enhanced functionality and/or performance after initial system deployment.

Quality. (1) The functional and physical uniformity around specified or design target values, with minimum variation from those targets. (2) The composite of material attributes, including performance, features and characteristics of a product to satisfy a given need.

Reliability. The degree, often expressed as failures per unit of time or time between failures, that a system or component will perform a required function under specific conditions for a specified period of time.

Remote. Outside of the immediate physical proximity. In the context of NIMS, “remote” refers to anything outside of the facility boundaries of the National Operations Control Center (NOCC), Operations Control Centers (OCCs), Service Operations Centers (SOCs), and Work Centers.

Status. The information about the location and state of a resource at a particular time.

Subsystem. Two or more configurations integrated according to an engineering design in which the independent functionalities and performance of each configuration combine to provide a specified set of functions or a required service.

System. A collection of subsystems integrated according to an engineering design in which the independent functionalities and performance of each subsystem combine to provide a specified set of functions or a required service.

Telecommunications. The FAA supplied network infrastructure that provides voice, data, and graphics connectivity between Tower systems and NAS infrastructure resources, Remote Maintenance Management System (RMMS) processors, other facilities, external information systems, service providers, and Tower system users.

User. Any person who interacts directly with Tower systems.

Workstation. An integrated set of hardware and software components, including one or more data entry devices, processors, displays, power sources, and equipment cabinets which is used by a user to perform Tower systems functions.

APPENIDX B. ACRONYMS

AF – Airways Facilities
ANSI – American National Standards Institute
ASHRAE – American Society of Heating, Refrigerating and Air Conditioning Engineers, Inc.
ASOS – Automated Surface Observing System
ATCSCC – Air Traffic Control System Command Center
ATCT – Air Traffic Control Tower
AWOS – Automated Weather Observing System
AWSS – Automated Weather Sensor System
CCB – Configuration Control Board
CD – Compact Disc
CFR – Code of Federal Regulations
CHI – Computer Human Interface
CIWS – Corridor Integrated Weather System
CM – Configuration Management
COI - Critical Operational Issues
COTS - Commercial-Off-The-Shelf
CRT – Cathode Ray Tube
DASI – Digital Altimeter Setting Indicator
DOT – Department of Transportation
DT&E – Developmental Test and Evaluation
FAA – Federal Aviation Administration
FAADDS – Federal Aviation Administration Data Display System
FAALC – FAA Logistics Center
FDIO – Flight Data Input/Output
FTI – FAA Telecommunications Infrastructure
HVAC - Heating, Ventilation, and Air Conditioning
ICEA – Insulated Cable Engineers Association
IDS4 – Integrated Display System 4
IEEE - Institute of Electrical and Electronic Engineers
ISO - International Standards Organization
ITWS – Integrated Terminal Weather System
LLWAS – Low Level Wind Shear Alert System
LAN – Local Area Network
LCD – Liquid Crystal Display
LRU - Lowest Replaceable Unit
MSDS – Material Safety Data Sheets
MIAWS – Medium Intensity Airport Weather System
NAS - National Airspace System
NCP – NAS Change Proposal
NEC – National Electric Code
NEPA - National Environmental Policy Act
NFPA - National Fire Protection Association
NIMS - NAS Infrastructure Management System

NOTAMs - Notices to Airmen
NOCC - National Operations Control Center
OCC - Operations Control Center
OSHA – Occupational Safety and Health Administration
OT&E – Operational Test and Evaluation
PBL – Product Baseline
P³I – Pre-Planned Product Improvement
QA – Quality Assurance
RDP – Reprourement Data Package
RMMS - Remote Maintenance Management System
RMS - Remote Monitoring Subsystem
RVR – Runway Visual Range
SAWS – Stand Alone Weather Sensors
SMS – Surface Management System
SOP – Standard Operating Procedures
STD – Standard
TCP/IP – Transmission Control Protocol/Internet Protocol
TDWR – Terminal Doppler Weather Radar
TIB – Technical Instruction Book
UPS – Uninterruptible Power Supply
WAN – Wide Area Networks
WARP – Weather and Radar Processor
WJHTC – William J. Hughes Technical Center

APPENDIX C. REFERENCES

Title	Number
NAS System Requirements Specification	FAA NAS-SR-1000
Electronic Equipment General Requirements	FAA-G-2100
Federal Compliance with Pollution Control Standards	E.O. 12088
Federal Acquisition, Recycling, and Waste Prevention	E.O. 12873
Asbestos	40 CFR 61
FAA Occupational Safety and Health Program	FAA Order 3900.19B
Energy Efficiency and Conservation at Federal Facilities, and the Energy Policy Act of 1992	E.O. 12902
Thermal Environmental Conditions for Human Occupancy	ASHRAE Standard 55
Ventilation for Acceptable Indoor Air Quality	ASHRAE Standard 62
Lighting Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment	FAA-STD-019
Transient Protection, Grounding, Bonding, and Shielding Requirements for Equipment	FAA-STD-020
Practices and Procedures for Lightning Protection Grounding, Bonding, and Shielding Implementation	FAA Order 6950.19A
Fundamental Considerations of Lightning Protection Grounding, Bonding, and Shielding	FAA Order 6950.20
Grounding Shielding and Bonding	ANSI/IEEE 1100-1992
Cable Control, Shielded Pairs, Interior	FAA-E-2004
Short Circuit Analysis and Protective Device Coordination Study	FAA Order 6950.27
National Fire Protection Association (NFPA)	Standard 70
National Electric Code (NEC)	Article 310
U. S. DOT FAA Specification Electrical Work, Interior	FAA-C-1217F

Title	Number
Electrical Power Policy Implementation at National Airspace System Facilities	FAA Order 6950.2D
Telecommunications Asset Management	FAA Order 1830.6B
Telecommunications and Information Systems Security Policy	FAA Order 1600.66
Control of Hazardous Energy (Lockout/Tagout)	OSHA 29 CFR 1910.147
FAA Facility Security Risk Management Program	FAA Order 1600.69
Personnel Security Program	FAA Order 1600.1D
Contract Training Programs	FAA-STD-028
General Maintenance Handbook for Airways Facilities	FAA Order 6000.15C
Airway Facilities Maintenance Personnel Certification Program	FAA Order 3400.3G
Standard Practice for Commercial Packaging	ASTM-D3951-98
Utilization and Disposal of Excess and Surplus Personal Property	FAA Order 4800.2C
Quality Management and Quality Assurance Standards - Part 3: Guidelines for the Application of ISO 9001:1994 to the Development, Supply, Installation and Maintenance of Computer Software	ANSI/ASQC-Q-9001 and ISO-9000-3